DC Converter Stations

Based on the Norway-Netherlands DC link (shown below) a 1000 megawatt DC converter station could fit on less than 4 acres (not 40 acres as was claimed by consultants) and would cost an estimated $125 million (not 250-500 million as claimed), which could reduce the overall construction costs by up to 38% based on actual construction data. However, underground DC could also save an additional $6 billion to $20 billion in environmental damages, business and property losses, along with providing up to a 400% increase in transmission capacity, higher transmission efficiency, lower maintenance, better security, the elimination of EMF and related medical liabilities.
Comment Set B0014, cont.
Underground Powerlink Association

580 kilometer (360 mile) 700 megawatt 450,000 volt DC underwater cable between Norway and the Netherlands

700 megawatt 450,000 volt DC to AC Converter station on a 3 acre parcel, using approximately 2.75 acres (2007)
Comment Set B0014, cont.
Underground Powerlink Association

Transmission for Los Angeles Department of Water and Power

The LADWP’s 850 mile 500 kV DC Intertie delivers 3100 megawatts using pairs of pylons carrying 2 cables each, 2 cables on one pylon for positive and 2 cables on the second pylon for negative. Each cable is steel reinforced aluminum 1.8 inches in diameter (ACSH 2312 mil designation). The DC to AC converter station and the AC to AC transformer distribution facility is located together in the San Fernando Valley near where the 210 and 5 Freeways meet. The DC to AC facilities are much smaller now. 500 kV DC is equivalent to the capacity of 1000 kV AC since there is a positive and negative difference on DC cables. The LADWP converter station and its large AC distribution facility for the city of Los Angeles and its 3100 megawatt lines are widely distributed over about 33 acres (in a area approximately 2400 feet by an average of 600 feet) west of the 5 freeway (or west of Sepulveda Blvd) and south of San Fernando Road, with a smaller portion being used for DC conversion. For a facility with less than 1/3 the capacity with newer hardware, approximately 5 acres would be sufficient for DC to AC conversion on a project the scale of the Sunrise Powerlink. In an urban setting such converter facilities have been placed completely underground, under a park or under a parking structure. To observe the considerably larger and older, 1965-70, LADWP facilities use Google Maps to find: San Fernando Rd & Sepulveda Blvd, Sylmar, CA 91342, then select satellite view.
3100 megawatt DC to AC converter and a large AC transformer distribution network for LADWP, begun in 1965, bringing power 850 miles from Oregon and Washington State hydroelectric dams on the Columbia River. DC to AC conversion represents a small portion of this proven facility that has been functioning efficiently for approximately 40 years.
III. Electric Vehicle Power Requirements, at 10 kWh / day, could require 20,000 megawatts

Electric Transportation

GM Volt, 161 horsepower electric car, 0-60 in 8.5 seconds, 600-700 mile range.

Impact of Plug-In Hybrid cars on electrical transmission capacity

General Motors Chevy Volt plug-in hybrid is estimated to require 240 watt hours of charging to travel one mile, or about 1 kWh to travel 4 miles and 10 kWh to move 40 miles, which is its expected all electric range. At 5½ cents per kilowatt hour (.05569) for peak summer rates to charge an electric vehicle, then each mile would cost about 1.4
cents in electricity costs through SDG&E. At the highest residential rates of 15 1/4 cents per kilowatt hour (.15267) the cost would be 3.8 cents per mile driven, which is still well below gasoline costs. At $3.60 per gallon, a 30 MPG vehicle would cost 12 cents per mile for fuel, as well as require far greater maintenance, labor and parts expenses than an electric vehicle, which could amount to at least 10 cents per mile in addition, or totaling approximately 22 cents per mile, excluding depreciation of well over $1000 per year for the lower cost vehicles, which can easily exceed the cost of the gasoline, plus insurance which can range from $600 to well over $2000 dollars per year. Nevertheless, saving 20 cents per operating mile can cut transportation costs to less than 1/2 for most people. So if 1 million people drive their plug-in electric cars an average of 40 miles per day, and need to use 10 kilowatt hours to charge their vehicles over a 10 hour period, that would amount to an additional demand of 1000 megawatts. Naturally, when people notice that they could easily afford to move away from 1 ton vehicles and drive 3 ton trucks again, then electric consumption would rapidly grow for three reasons. 1st there would be no incentive to drive a gasoline powered vehicle so nearly all domestic and small business vehicles would shift toward plug-in technology. 2nd Since plug-in electric is considerably more efficient than gasoline, then heavy vehicles would no doubt once again replace conventional automobiles, perhaps tripling electric vehicle charging consumption. 3rd Since there is a continuing rapid population influx across California’s borders, with a population that doubles every 20 years, then far greater electrical capacity will have to be provided for. So is the proposed electrical capacity for the Sunrise Powerlink capable of charging 3 to 6 million cars which require 30 kilowatt hours of charging capacity every day? That would amount to between 10,000 and 20,000 megawatts, or about 10 to 20 times the proposed Sunrise Powerlink for San Diego County alone, and about 60 to 80 times the capacity of the Sunrise Powerlink to charge all the household vehicles in 5 Southern California counties. How could any overhead power line system carry cables heavy enough or voltages high enough to address such a demand, without covering over Southern California with 80 additional Sunrise Powerlinks? Obviously weight is not an issue with higher efficiency DC copper underground cables, which can already quadruple the capacity of the Sunrise Powerlink, operating at 500 kV DC using only two 6¼ inch cables in a 5 foot deep trench, 1 foot in width. Why would underground DC transmission be avoided? Because there is more familiarity with the AC transformers at SDG&E? So far not one reason based on fact, overall cost savings and environmental protection has been offered which supports overhead power line construction.

**Photovoltaic Automotive Charging**

If solar panels were used to charge a plug-in hybrid car such as a Chevy Volt, then 1 kW of photovoltaic panels during 10 hours could fully charge the car to run 40 miles. If Nanosolar's panels were used, at a cost of $1 per watt, then the cost of the panels would...
Comment Set B0014, cont.
Underground Powerlink Association

be $1000 which would pay for itself in fuel savings alone within 10,000 miles of driving, which would typically occur well within 1 year, with panels that could last well over 30 years. Apparently photovoltaic panels can power a car over 50 times cheaper than gasoline, so spending $50 at a gas station could be replaced by a $1 solar investment.

Autos, SUV’s and pickups registered for 2006 in Southern California

<table>
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<tr>
<th>County</th>
<th>Autos</th>
<th>Trucks</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>San Diego County</td>
<td>2,295,324</td>
<td>(autos 1,875,748 + (trucks 503,511 * .83 = 419,576)</td>
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</tr>
<tr>
<td>Orange County</td>
<td>2,281,798</td>
<td>(autos 1,926,712 + (trucks 426,120 * .83 = 355,086)</td>
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</tr>
<tr>
<td>Riverside County</td>
<td>1,417,570</td>
<td>(autos 1,091,918 + (trucks 390,798 * .83 = 325,652)</td>
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<tr>
<td>Los Angeles County</td>
<td>6,912,168</td>
<td>(autos 5,917,189 + (trucks 1,194,022 * .83 = 994,979)</td>
<td></td>
</tr>
<tr>
<td>Ventura County</td>
<td>650,085</td>
<td>(autos 524,605 + (trucks 150,582 * .83 = 125,480)</td>
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<tr>
<td>Total:</td>
<td>13,556,945</td>
<td>cars, SUV’s and pick-ups</td>
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</tbody>
</table>

Nanowire Battery Technology

- Increasing the range of an affordable electric car beyond 400 miles
- Providing solar electric storage for night and days of reserve capacity

Stanford researchers have found a way to use silicon nanowires to reinvent the rechargeable lithium-ion batteries that power laptops, iPods, video cameras, cell phones, and countless other devices.

The new technology, developed through research led by Yi Cui, assistant professor of materials science and engineering, produces 10 times the amount of electricity of existing lithium-ion, known as Li-ion, batteries. A laptop that now runs on battery for two hours could operate for 20 hours, a boon to ocean-hopping business travelers.

“It’s not a small improvement,” Cui said. “It’s a revolutionary development.”

The breakthrough is described in a paper, “High-performance lithium battery anodes using silicon nanowires,” published online Dec. 16 in Nature Nanotechnology, written by Cui, his graduate chemistry student Candace Chan and five others.

The greatly expanded storage capacity could make Li-ion batteries attractive to electric car manufacturers. Cui suggested that they could also be used in homes or offices to store electricity generated by rooftop solar panels.
Comment Set B0014, cont.
Underground Powerlink Association

Photos taken by a scanning electron microscope of silicon nanowires before (left) and after (right) absorbing lithium. Both photos were taken at the same magnification. The work is described in “High-performance lithium battery anodes using silicon nanowires,” published online Dec. 16, 2007 in Nature Nanotechnology.

Reference links:
GM Plug-in hybrid charging: http://en.wikipedia.org/wiki/Battery_electric_vehicle
Nanosolar photovoltaics: http://www.nanosolar.com/about.htm
DMV Vehicle count: http://www.dmv.ca.gov/about/profile/est_fees_pd_by_county.pdf, 5/6 (approx. 83%) of the trucks listed are pick-up trucks typically for household use according the California DMV statistical division, or about 1/6 are higher capacity and long-haul highway vehicles.
IV. Solar Electric Generation at $1 per watt equals ½ cent per kilowatt hour

The first choice alternative to the Sunrise Powerlink was gas fired powerplants. While that is a vastly more attractive option than overhead extra high voltage power lines, we would also encourage some consideration for printed copper indium gallium diselenide photovoltaic technology which is being used in homes, carports, office buildings and large scale power plants, with manufacturing in San Jose California and panel costs of $1 per watt, which can be competitive with gas powered power plant construction for peak demand generation purposes.

Nanosolar’s photovoltaic panels are being priced at $1 per watt, which amounts to ½ cent per kWh, or 30 to 80 times less costly than from utility companies.
Nanosolar Photovoltaic Panels

Solar panels that could deliver 1000 watts would cost $1000 and deliver approximately 12 kilowatt hours of electricity per day, for more than 40 years, delivering a total of over 175,200 kWh, at $.0057 per kWh or about ½ cent per kWh. With electric companies charging 15 to 40 cents per kWh, then the newer panels can generate electricity at 30 to 80 times less cost, which would mean that the power companies could ultimately supply most of its power at night and during rainy weather, so that anyone on the electrical grid wouldn’t need batteries or a back-up system. However, it may ultimately be less costly to generate hydrogen at home through electrolysis to drive a fuel cell whenever backup power is needed. While it may take a while for homes to be adapted, or for parking lots to be covered with solar panels, companies are being created in California to address the large scale installation of photovoltaic systems, along with the implementation of large scale 50 to 100 megawatt solar installations in China and Europe, using the same panels.

A common observation has been that large numbers of people are not prepared to adapt to roof top solar electrical generation. Several issues have changed that perspective. 1st long life solar panels are now able to provide far higher capacities at $1 per watt, and 2nd companies are now available to provide professional installation and maintenance at affordable prices. Which is very different than what occurred during the 1970’s when uneducated and often incompetent construction workers who didn’t understand the technology and couldn’t find the parts, simply ripped out solar heating systems in new homes and replaced them with the old technology they understood.

154 megawatt solar concentrator power station in Victoria Australia, at the higher cost of $2.70 per watt, potentially located on a farm, (solarsystems.com).
Comment Set B0014, cont.
Underground Powerlink Association

1.6 megawatts of solar generation on the roof of Google’s offices

153 kilowatt from a solar carport in Vacaville California
Solar tree in Styria Austria (70 panels on 5 branches, occupying a little over 1 square foot on the ground)

Ramona California, February 26, 2008
Underground Power Association, PO Box 1032, Hemet, California 92546
www.undergroundpower.us, info@undergroundpower.us

Aspen Environmental Group, 235 Montgomery Street, Suite 935, San Francisco, CA 94104-3002
Tel: 415-955-4775, sunrise@AspenEG.com

CPUC Public Advisor, 505 Van Ness Avenue, Room 2103, San Francisco, California 94102
866-849-8390, 415-703-2074, public.advisor@cpuc.ca.gov

Southern route alternatives and underground options
During the past several years the cost of high capacity underground power lines capable of delivering up to 3000 megawatts has significantly declined, allowing up to triple the capacity of the proposed Sunrise Powerlink, while saving at least $530,000,000 in construction costs, based on projects of similar length and capacity. The advantages can be an extreme reduction in environmental damages, with zero impact to wilderness regions, state parks and federal lands, residential and business areas, which would amount to many billions of dollars in long term savings, both to the residents of California and for San Diego Gas and Electric. However for some reason a review of these issues has been ignored by SDG&E, the CPUC, it’s consulting firms, engineers, economic and legal staff, and we have been excluded from participation.

While we fully concur with the advantages of the “no wires” and solar options, there is still a powerful incentive to continue evaluating overhead AC high power lines along with a wide range of environmental and economic damages, based on erroneous and missing data, which have apparently been determinative arguments. We have identified a number of options along the Southern Route in order to significantly reduce environmental damages, provide for future capacity and reduce construction costs, as well
Comment Set B0014, cont.
Underground Powerlink Association

as provide significant improvements in security and reliability, fire and health safety, an immediate increase in transmission capacity and efficiency, with reduced maintenance costs, while eliminating the need for future damages.

Underground DC cables along a highway

Since weight and cable fatigue are not problems with underground power lines, heavier copper cables can be utilized, capable of delivering 3000 megawatts using only 2 cables, without causing significant environmental, property or business damages, EMF, ionization or related health risks; all at a far lower cost than overhead power lines, saving SDG&E over $530,000,000 in installation costs plus many billions in damages. (Installed in a trench 5 feet in depth and 1 foot in width with a concrete cap or under roadway pavement, all of which is continuously and more rapidly installed).
Comment Set B0014, cont.
Underground Powerlink Association

Anthropological Nature Reserve, Research Center and Recreation Area at Bankhead Springs California, elevation 3615 feet, overlooking Interstate 8 west and BLM’s McCain Valley, all targeted for 160 tall pylons and an array of extra high voltage cables.

Proposed mountain top location for 160 foot high pylons to carry hot sagging 500,000 volt power lines, despite the fact that underground power line alternatives are available that cost considerably less to install than the high-impact, environmentally destructive overhead high-power lines being proposed.

The underground approaches mentioned can become a significant opportunity both for SDG&E and the CPUC to review and utilize an extremely low impact environmental approach that can protect California’s environment and economic future, saving billions of dollars in property losses, as well as save SDG&E billions in long term construction costs and liabilities by using a more efficient, more reliable, less damaging and safer underground approach to power line construction, all of which has been demonstrated in over 50 large scale underground high power lines that have been installed worldwide.
Comment Set B0014, cont.

Underground Powerlink Association

To be of assistance with the Sunrise Powerlink issues currently being addressed, we should mention a few details and solutions that could be of mutual benefit for the region, both environmentally and economically, as well as in terms of reliability and safety.

1. First, while we have noticed the significant long term economic and environmental advantages available through on-site solar facilities, we are also not in opposition to nondamaging power lines; in fact we would encourage 3 times the capacity as SDG&E has proposed for the Sunrise Powerlink, because power demands will undoubtedly grow as major car manufacturers begin delivering plug-in hybrid vehicles in 2 years, which could ultimately require the equivalent of 20 additional Sunrise Powerlinks, which naturally would have an extraordinarily devastating effect on San Diego County, particularly if the extra high voltage power lines were above ground.

2. Naturally, like thousands of others in the region, we are also very concerned about sustaining serious damages as a result of the impact of 500,000 volt power lines on 160 foot tall pylons overhead, bisecting our research and nature reserve, as well as incurring any lack of interest by SDG&E to pay for those damages, particularly if extra high-voltage power lines are to be built directly through our Anthropological Reserve, which would devastate our wilderness, research, construction and recreational areas, as they exist and are currently planned, and we would clearly be extremely concerned about the responsibility of SDG&E to pay for the Anthropological Reserve based on equivalent quality, size, viewshed and accessibility (see Appendix B), in addition to the labor and expenses related to our transition, which has taken decades of research, labor and planning to accomplish to this point.
3. Finally, underground cables\(^1\) whether AC or DC, have not been offered for Southeastern San Diego County (see Appendix A), although they have been proposed extensively for the Northern Route. Underground cables through the eastern 22 miles of San Diego County could eliminate impacts to the towns of: Jacumba, Bankhead Springs, Boulevard, Manzanita, Tierra Del Sol, Live Oak Springs and Campo, in addition to the Campo and La Posta Reservations, the BLM’s McCain Valley, the Anza Borrego Desert State Park, the Cleveland National Forest, and our Anthropological Reserve, all of which would be otherwise damaged or made uninhabitable, bisected and permanently degraded by huge pylons supporting hot sagging 500,000 volt overhead power lines, along with increasing medical evidence that electro-magnetic fields from such high power lines increases leukemia rates by 70\%, in addition to causing significant increases in lung cancer through the ionization of pollutants.

4. While over 50 large scale underground DC lines have been installed worldwide at considerably lower costs\(^2\) than the proposed Sunrise Powerlink, offering triple the capacity or 3,000 megawatts all in one 5 foot deep trench that’s 1 foot in width, which can be rapidly and continuously trenched under existing roadways, without impacting or damaging thousands of properties, families or defacing the scenic and recreational areas of San Diego County, which happen to be a significant component of California’s $90 billion per year recreation and tourism industry. However, we do not see that SDG&E has much or any regard for the 6 to 20 billion dollars in short to medium term damages that would be inflicted by overhead extra

\(^1\) Reuters News Service (May 21, 2007) reports that Homeland Security is paying over 60\% of the cost for Consolidated Edison to install a more secure high capacity underground cable to

\(^2\) The BritNed UK-Netherlands powerlink delivers 1300 megawatts over 161.5 miles at a cost of 600 million Euros, or $870 million, all of which is higher in capacity and longer in distance than the Sunrise Powerlink and provided at a considerably lower cost than the overhead AC power lines being proposed. With a cost of $870 million for the 161.5 mile BritNed Powerlink, then the $1.4 billion Sunrise Powerlink would cost an additional $530,000,000 (or 1.6 times more) in order to build approximately 700 huge pylons 160 feet in height, all in order to avoid a vastly more benign, as well as lower cost underground DC option.
Comment Set B0014, cont.
Underground Powerlink Association

high-voltage power lines as proposed. All of which is also seriously detrimental to SDG&E financially, based on installation expenditures alone, and extremely costly impacts to numerous communities, permanent damages to the environment, as well as a future medical liability that may ultimately require the dismantling of an AC Sunrise Powerlink.

In excess of 350 fires per year are started by high power lines each year in California, which included the burning of the majority of approximately 2000 homes in Southern California during 2007, and 3000 homes during 2003, including the burning of our own home when power lines oscillated and arced during a high winds, which the power company termed an "Act of God", without any economic consideration for the losses we incurred, nor ever offering any effort to make the power lines more secure. Apparently the victims of disastrous power line engineering and corporate decisions are required to repeatedly pay for all damages and losses, even in the billions of dollars (reference Appendix D).

We have been trying to protect our anthropological reserve from such severe impacts, excavations, road building and 160 foot tall pylons anchored to the tops of our mountains carrying an array of hot sagging 500,000 volt extra high-voltage power lines directly over land which is essential to our research, laboratory, visitor and recreational areas. To defend ourselves from such extreme and unnecessary damages we have provided SDG&E and Sempra Energy a considerable research effort into safer, lower cost, extremely low environmental impact engineering alternatives, expending almost four thousand hours documenting these alternatives, including underground DC power lines, which we are aware that SDG&E has not independently reviewed in any significant way, all without any response from SDG&E to any of these issues, not even engineering comments, only the continued pursuit of an extremely damaging approach that costs approximately $530,000,000 more to build, while delivering only 1/3 the capacity of the underground DC alternative, with considerably greater transmission losses, while causing us and many others devastating and irreversible harm. At the same time SDG&E claims to have no interest in providing "just compensation" for losses, which would necessitate
Sunrise Powerlink Project
3. Comments and Responses on the Draft EIR/EIS

Comment Set B0014, cont.
Underground Powerlink Association

equivalent replacement costs for the Anthropological Reserve. We understand that there is an intention to reinterpret eminent domain in order to allow causing unnecessary economic, environmental and health damages, which have been documented by prior projects, as well as through large scale medical studies. However, among the other issues, the health issues also cannot be easily denied since molecular cell biology has been providing a more detailed understanding of the developmental and cellular mechanisms that are inherently dependant on our own internal cellular electrical fields, which are significantly disturbed and adversely affected by more powerful external electro-magnetic fields (EMF) and ionization generated by high power lines, which has led to a significant increase in cancer rates as identified in large scale scientific studies, all of which constitutes and add a formidable biological hazard that would devastate our Anthropological Reserve.

**Not considering the Southern Route and the underground alternatives apparently can insure that the most damaging route possible will be implemented by SDG&E!!!**
Comment Set B0014, cont.
Underground Powerlink Association

Environmental Damages along hundreds of high-power line access roads (photos from CPUC complaints against the Powerlink by a neighbor of an existing SDG&E power line, see Appendix C).  

Photo of an SDG&E Power Line Access Road During Rain Cutting a Ravine Without Maintenance
Comment Set B0014, cont.
Underground Powerlink Association

We realize that the staff at SDG&E and subcontracting firms have a specialized role, and that solving any larger issue even if it could save SDG&E billions of dollars may not be pertinent to their work. So, perhaps the matter of access, mentioned in item number 2 may be the only relevant issues to SDG&E’s employees. However, I am obligated to mention that the next items, numbers 3 and 4 are issues which are also relevant to right-of-ways, and also could significantly benefit SDG&E’s efforts, as well as eliminate the destruction of decades of our efforts and investments by hundreds of others. Of course, as anyone would expect, SDG&E may find it in their financial interest to claim a lack of knowledge of major damages being caused, or claim that they had no alternatives, or that the State was responsible for the decision process, or that the medical data was not available, or that the irreplaceable natural qualities of this region were practically worthless since it’s not developed urban property, or perhaps those who died of cancer ultimately couldn’t prove their case against ionized carcinogens or EMF in a court of law.

As you may know, all this information has been provided to SDG&E and the CPUC by C.B.H., and that if you or SDG&E need additional scientific, engineering, environmental or economic information, we could offer considerably more research or assistance; something we noticed that most SDG&E employees and consultants have apparently learned to avoid, perhaps to maintain their jobs, unfortunately also to the detriment of SDG&E, as well as those impacted. Of course, most anyone might notice that demanding to make extraordinarily damaging decisions, when harmless, as well as lower cost alternatives exist, all offers no redeeming value, is also completely incomprehensible and is strictly an act of force; consequently understanding is needed to allow for a beneficial solution to emerge, which apparently continues without any noticeable progress.

Accommodating, enforcing or inadvertently sanctioning damages to this anthropological nature reserve, including the devastation of our projects, our personal and economic survival, does adversely impact many decades of research, labor and investment, as well as the lives of our participants, all without securing indemnification and full replacement costs, which does certainly move toward the complete unraveling and destruction of the entire project here, as well as constitute criminal activity for participation, which would include any form of participation of our own as well, if we ever
Comment Set B0014, cont.
Underground Powerlink Association

assisted with such needless damages, along with full financial liabilities for all damages and losses, including the cost of a comparable reserve with equivalent wilderness, natural geologic features and monuments, recreational capabilities, research, access, viewshed and anthropological values, which apparently would then become a major liability and financial responsible for the entire Anthropological Reserve, all of which combined is clearly not replaceable, nor approximated at real estate prices less than $300 thousand per acre for approximately 800 acres, plus habitat restoration costs of $25 to $75 per square foot, including equipment, irrigation, transportation, soil monitoring, botanical expertise, labor and expenses, which are required over not less than 4 decades. More recently we have seen wilderness listed at triple that amount which is not better or in any way advantageous.

In order to simply verify that SDG&E is not intending to cause damages or avoid restitution for all damages and losses that we would incur, we have included an acknowledgement form (Appendix E) which SDG&E may sign and return to us to accommodate their onsite access schedule at their convenience. Naturally, we request their forwarding us a list of anticipated visitation dates and groups or persons entering for the year, so that we could scheduled at least a month in advance, or provide for their rescheduling at a mutually convenient time. As SDG&E mentioned, if we are required to maintain personnel for on demand access or convenience, then we ask to be advised regarding reimbursement for assistance, related time and expense, and who we would contact regarding SDG&E’s entry schedule.